ISSUES AND STRATEGIES IN PREPARING A COAL SUPPLY PLAN

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Ian Coddington is the Principal of Coddington International Pty Ltd which he founded in 1986. Prior to forming Coddington International, Ian was General Manager, Marketing for the Coal Division of CSR Ltd (selling more than 10Mtpy). He has been in the coal industry for more than 20 years, including as a director of Port Waratah Coal Services. Ian is a graduate in commerce and law.

Coddington International offers a range of coal marketing advisory services to Australian and overseas coal producers, trades, local and overseas power utilities, bankers, investors, government, insurers and law firms. Publlications include the annual *CoalLink Global Overview* an the annual *CoalLink Chartbook*. The *CoalLink* publications provide a detailed analysis of the seaborne coal trade, which include price projections. An on-line version of the *Chartbook* will be soon available on oz-coal.com.

Ian brings an energy perspective that extends beyond coal, as he is a Senior Associate of Cambridge Energy Research Associates, the leading oil and gas strategy consulting firm in the USA and Europe. Ian has worked on a number of projects with CERA involving interfuel competition between oil, gas and coal.

Since mid 1996, Ian has been the Coal Consultant to the Union Power Development Co, and Independent Power Producer in Thailand that will shortly start to construct a 1400MW coal-fired power station. He is also a coal consultant to an Australian power utility.

During the early 19990s, Ian conducted numerous International Marketing programs for MBA students at three universities in Sydney and was the author of two distance education programs for two regional NSW universities.

Issues and Strategies in Preparing a Coal Supply Plan

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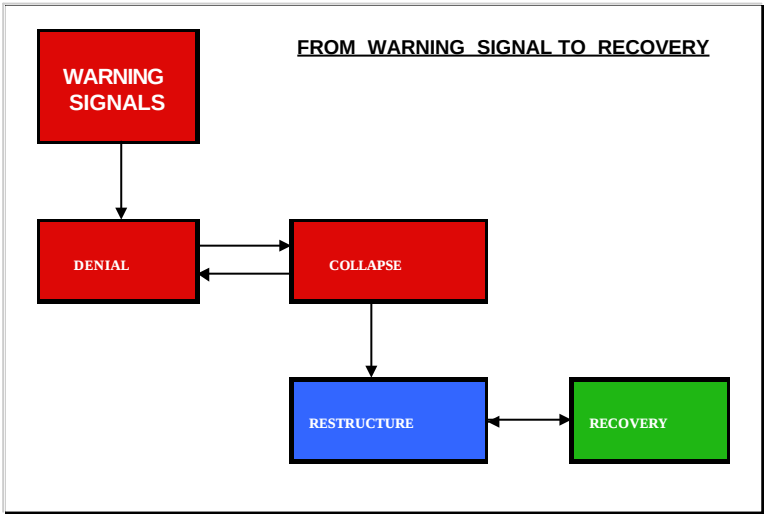
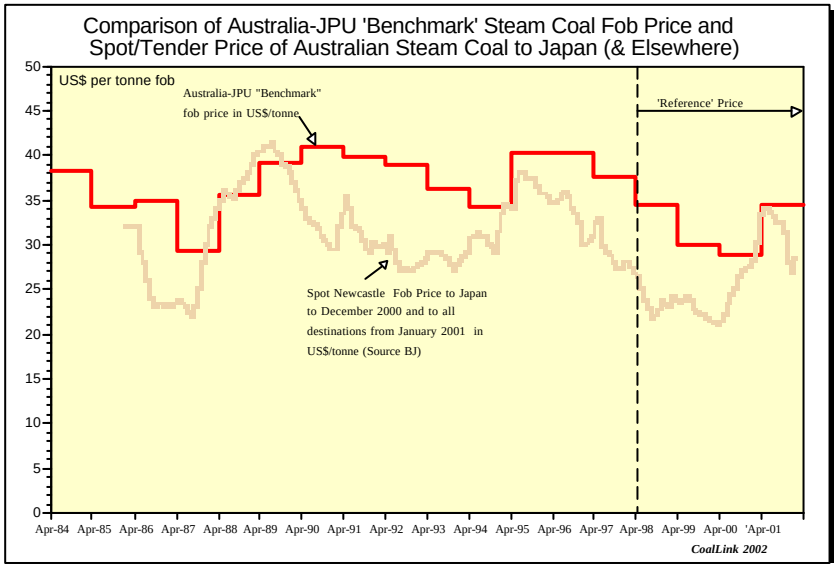
1.0 Introduction and Objectives of Preparing a Coal Supply Plan

Forecasts about the future are usually based on historical trends and assumptions about the future. Forecasts will continue to fail to foretell the future for three main reasons:

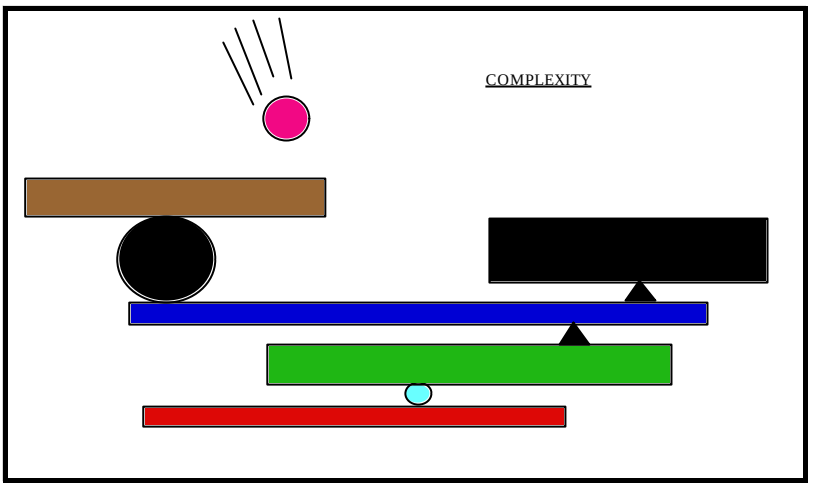
- **Surprise**: the failure to predict the unexpected. For example, wars, the stock market crash of 1987, natural disasters, and policy reversals such as the devaluation of the Baht in Thailand on 1st July 1997. Often there will be warning signals, but 'denial' will usually mean that preemptive action is not taken.



- **Dislocation**: the failure to predict the timing of a 'peak' or 'trough' or a failure to predict the rate of recovery or decline. In the case of the coal price cycle, forecasters know that there is a price cycle and that the upswing is usually for 2 to 3 years and the downswing for 3 to 5 years, but are unable to predict the peak or trough or how long it will last.



- **Complexity**: the failure to understand the interactions between all the factors that should be considered in making the forecast. In the case of imported steaming coal there are the different factors affecting supply and demand in each economy importing or exporting steaming coal, use and price of substitute fuels, government policy, foreign exchange requirements, changes in exchange rates affecting cost competitiveness, strikes, political intervention, deregulation, Kyoto Protocol impacts, technology, etc.



Whilst it may not be possible to forecast the future, it is possible to manage the uncertainty that flows from this unpredictability.

It is the **coal supply plan** that can provide the power utility with a tool to risk manage the uncertainty about the delivery, price, and quality of imported coal.

In preparing a coal supply plan, a power utility will want to ensure:

- Sufficient coal in the stockyard at all times to keep the power station fully operational (that is, "the lights must not go out"),
- Lowest fuel cost, after taking into account the delivered price of the coal and utilisation of the coal,
- Lowest cost impact of coal quality on maintenance, emissions, ash disposal etc.,
- Meeting all environmental requirements, even when the FGD units and precipitators are not operating,
- Ability to vary the amount of coal imported to take account of increased or decreased electricity demand by customers, and
- Meeting shareholder, lender and government policy requirements.

2.0 Power Station Design Factors Impacting on Coal Supplier Selection

2.1 Boiler design and environmental requirements

Each boiler will be designed around a 'design' coal. The design of the boiler, FGD, and precipitators will determine the acceptable range of coal quality characteristics of coals that can be purchased.

In determining the range of acceptable coal qualities, there may also be the question of whether the boiler maker's warranty requires certain specification limits to be imposed on purchased coal quality for energy, moisture, ash, sulphur, volatile matter, fuel ratio, HGI, and ash fusion temperatures, etc.

However, it may be possible to burn coals outside of this acceptable range by the blending of coals. For example, the blending of Indonesian sub-bituminous coals with Newcastle coals has been found to be effective at many power stations that could not use 100% sub-bituminous coals.

Power utilities usually have a technical approval process for accepting a new coal brand that involves evaluation of specifications, and testing of samples and trial cargoes. The recent development of open tendering, where coals are bought purely on their specification, raises the issue of whether a power utility is prepared to buy coals without prior testing and evaluation.

Emission requirements assume that the FGD and precipitator are working. But, does the power station have to shut down if the FGD unit fails (or is closed for maintenance) or could the power station decide to store a very low sulphur coal(s) on the stockpile that could be burnt in these circumstances and meet SOx emission requirements. The same issue could apply to coals producing low dust (if the precipitators were not in operation).

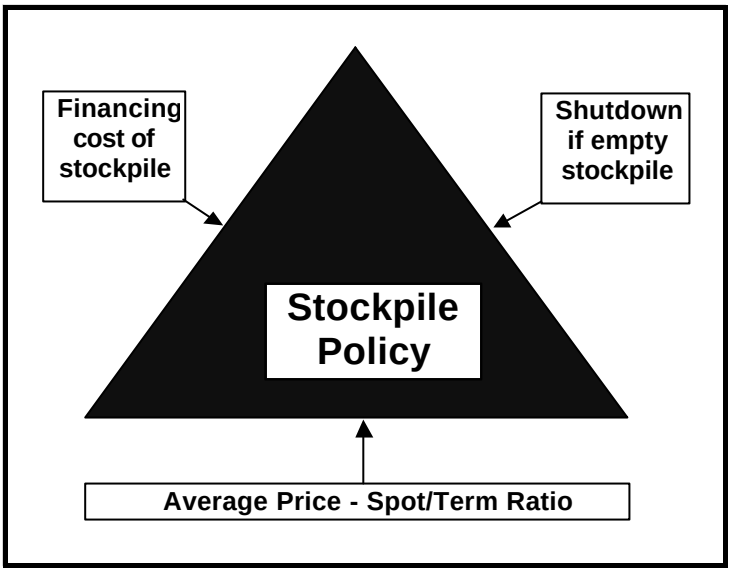
Ash disposal is becoming a major cost item for some utilities, so that the cost savings from the purchase of low ash coals need to be evaluated and included in the coal purchase strategy.

2.2 Coal stockyard capacity, blending capability and stocking policies

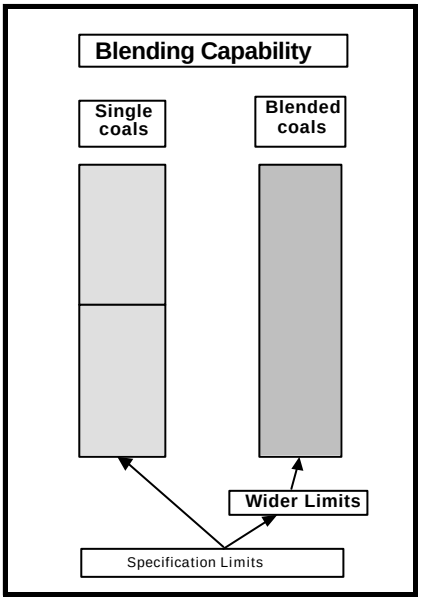
There are many different approaches to stocking policy. In Japan, most utilities stockpile about 30 to 45 days stocks. Taipower was required by legislation to keep at least 60 days stocks, but Taipower is now seeking to have this policy changed. Lenders to IPPs will usually impose a strict minimum stock requirement on the IPP (probably around 60 days). In Europe, legislation in some economies requires 3 or 6 month's stock (from an energy security viewpoint). Power utilities that always have 6 months stocks on hand could well decide to buy 100% of their coal on the spot market and offset the higher financing cost with a lower purchase cost.

The stockpile requirement is a trade-off between the cost of the stockpile, the risk of being out of stock, and the average coal price resulting from the spot/term contract ratio.

Stockpile policy is a key driver of the coal supply plan.



The blending capability of the stockyard will determine whether coals are burnt as a consistent blend for long periods of time of whether coals are burnt as single brands. Even if there is no sophisticated blending capability, crude blending can be achieved if there are two reclaimers and/or different coals are sent to different bunkers. The blending capability will have a significant impact on the range of coal qualities that can be purchased in the coal supply plan.



If sub-bituminous coals are to be stockpiled then extra care in their handling will be needed to prevent spontaneous combustion (and temperature, wind and rain will be factors to be considered). In addition, the height of stockpile needs to be lower, so that more space will be required in designing the stockyard (as well as access for front-end loaders to cut out hot spots). Thus there may be additional costs in using sub-bituminous coals (as well as the benefits).

2.3 Port unloading capability and alternative transport arrangements

The size of the vessels that can be discharged and the discharge rate will impact on ocean freight costs and the cost of the facility. A modern power station would need to be able to unload Panamax vessels. If capesize vessels can be discharged, then it might make purchase from more distant ports economic, but might also reduce the number of suppliers selected (since there would be a smaller number of shipments per year).

The Buyer needs to determine in the design stage the need for facilities such as sampling equipment at discharge, metal detectors etc, belt weighing and whether there is a need to be able to directly transfer coal to the bunkers from the ship (as an alternative to discharging on the stockpile).

If lenders are involved then they may want to assess the capability of the power station to receive coal if the discharge facility is damaged. For example, is there another port at which coal could be discharged and then transported by rail/road.

If there are environmental issues in relation to dust emissions during unloading, then this might impact on coal quality specifications (though water sprays etc might be sufficient to overcome the problem).

3.0 Shareholder, Lender and Government Policy affecting Supplier Selection

3.1 Lender requirements

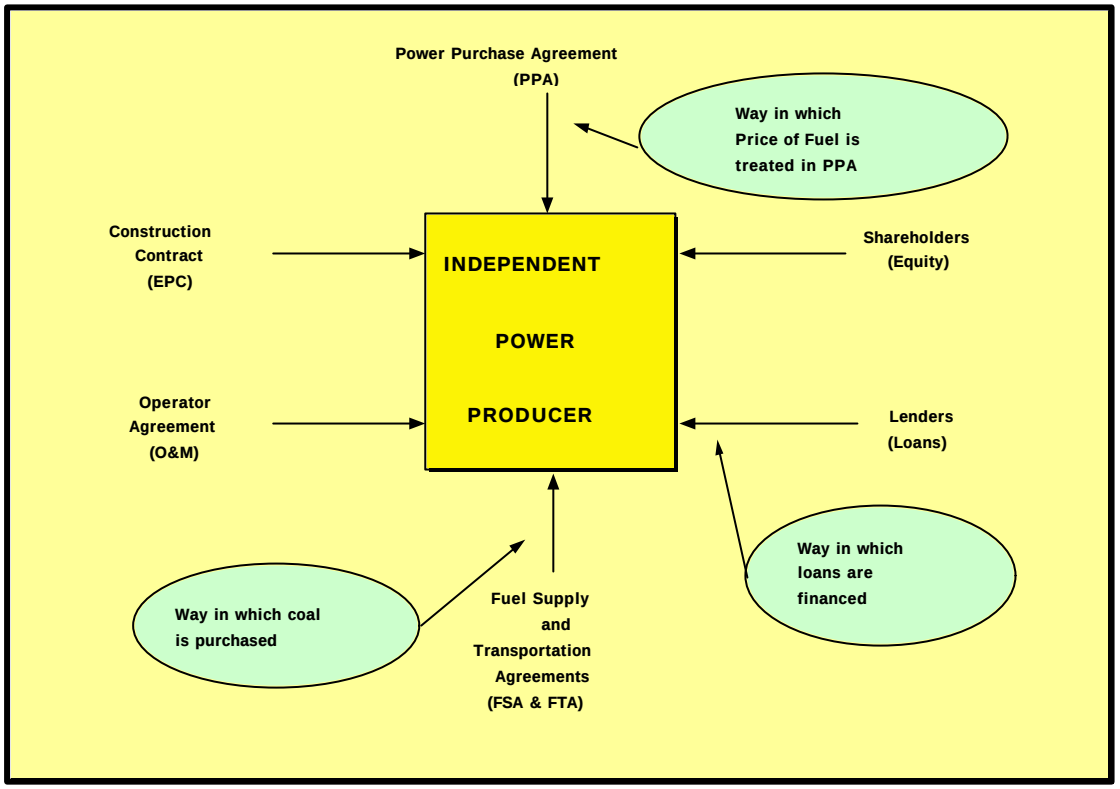
For major integrated utilities, lender requirements may not be an issue, since these utilities would usually borrow against their balance sheet. Consequently, there are likely to be no lender requirements impacting on the selection of coal suppliers or stocking policies.

In the case of an IPP with non-recourse project financing, it is highly likely that the lenders will impose requirements that will impact on the coal supply plan. The objective of the lenders seems to be to allocate the finance risk to the shareholders, operator, constructor and coal supplier. Three key drivers will impact on the coal supply plan (as shown in the diagram overpage):

- The method of financing,
- The way in which fuel is priced in the PPA, and
- The way in which the IPP purchases the coal.

The following diagram provides a matrix of possibilities and some examples of how different utilities have responded with risk reduction strategies for the purchase of coal. The lenders may also want to approve the coal supply plan, so that they can influence diversification and political risk issues.

Key risk drivers and risk reduction strategies



Procurement / Pricing \ Financing	BALANCE SHEET FINANCED BY IPP OR PARENT COMPANY GUARANTEE	NON/LIMITED RECOURSE FINANCE BY DOMESTIC BANKS ONLY	NON/LIMITED RECOURSE FINANCE WITH INTERNATIONAL BANKS
NATIONAL GENERATOR SUPPLIES COAL / ENERGY CONVERSION			NAPOCOR TO IPPS IN PHILIPPINES
IPP BUYS COAL DIRECTLY FROM COAL PRODUCERS / 'PASS THROUGH' COAL PRICE			MANGALORE IN INDIA
IPP BUYS COAL THROUGH 'AGENT' FUEL MANAGER / 'PASS THROUGH' COAL PRICE	JORF LASFAR IN MOROCCO FOR COAL SUPPLY	← →	JORF LASFAR IN MOROCCO TO BUY PLANT
IPP BUYS COAL FROM 'PRINCIPAL' FUEL MANAGER / 'PASS THROUGH' COAL PRICE			UNION POWER IN THAILAND
IPP BUYS DIRECTLY FROM COAL PRODUCERS / 'PASS THRU' COAL PRICE CHANGES			SPPs IN THAILAND
IPP BUYS DIRECTLY FROM COAL PRODUCERS / NO DIRECT 'PASS THRU' COAL PRICE	FORMOSA PLASTICS AND IPPS IN JAPAN	IPPS IN CHINESE TAIPEI	

3.2 Shareholder policy

There may be a number of shareholder policy factors that could impact on the coal supply plan, for example:

- One or more shareholders (or the power utility itself) owns or has a shareholding in a potential supplying mine,

- A shareholder may act as the fuel manager (and there may be a need to subject the fuel manager to policy directions about coal purchase),

- Alliances that allow the utility the gain greater purchasing power and increased diversification of supply sources. There may also be a need to take account of future merger, acquisition, or divestment potential.

- Willingness of shareholders (and possibly lenders) to absorb any force majeure conditions imposed by the electricity buyer. For example, if the electricity buyer will not accept force majeure by a coal supplier on the utility as a force majeure event, then the utility (and possibly lenders) would have to decide whether to absorb the risk or try to pass it on to the coal supplier.

- Whether to invest in ships to carry coal, or enter into term contracts for the ocean freight for part or whole of the utilities coal purchases (and buy on a FOB basis), or buy part or whole of the coal on a CFR basis (where the coal supplier does the shipping arrangements). The extent of control over vessel scheduling will impact on the coal supply plan.

3.3 Government policy

Government policy could impact on stocking policy, political risk (of supply source selection), ocean freight (if national vessels must be used), currency risk, electricity demand requirements (and government policies in relation to the use of gas, coal, oil, etc), and electricity pricing (including power pools pricing impacts etc).

4.0 Assessment of Risk Factors Likely to Impact on Coal Supply Plan

4.1 Stocking Policy

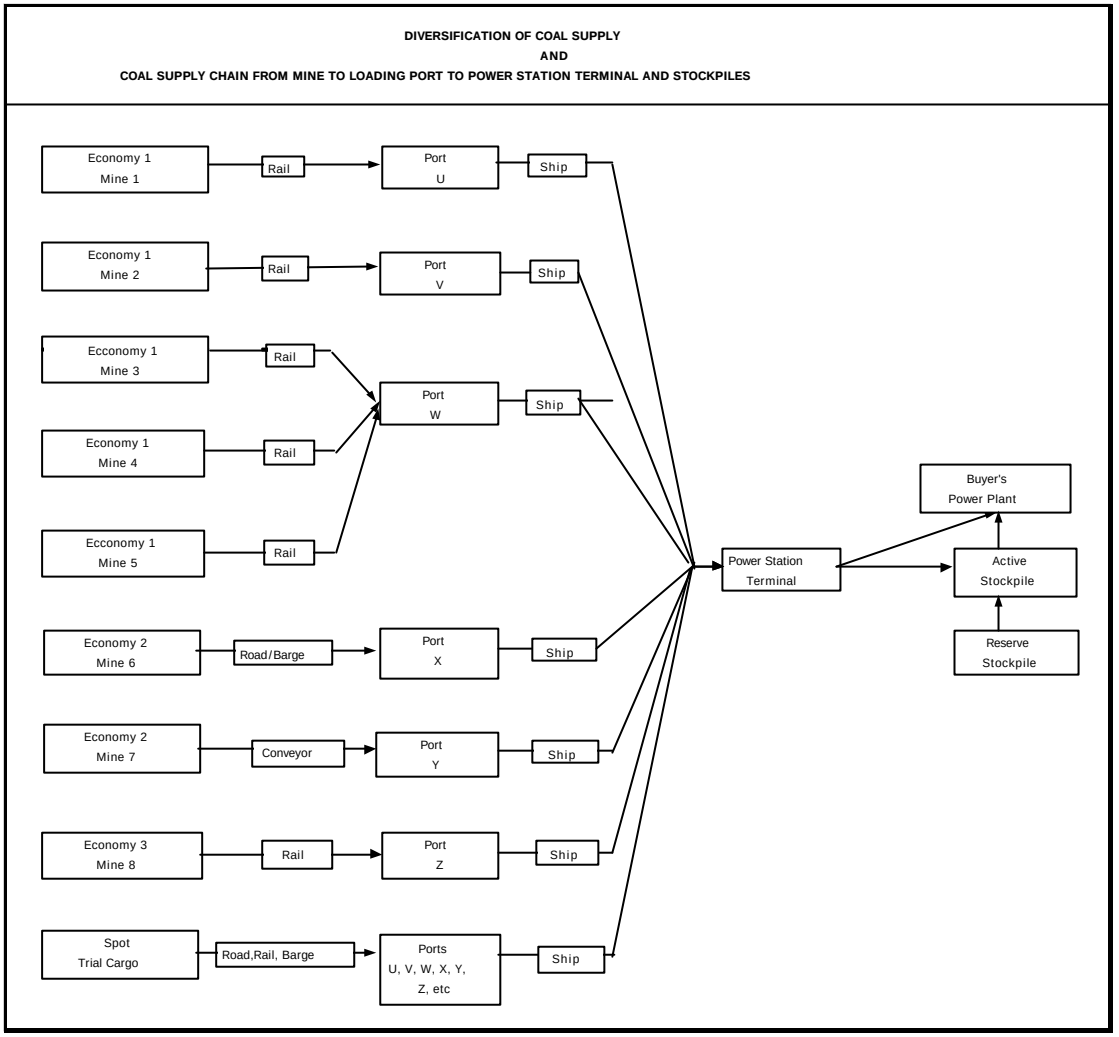
Apart from the risk of being out of stock and the financing cost, the number of days of minimum stock will impact on the coal supply plan in terms of:

- The ratio to spot/term contracts,

- The number of coals that can be separately stored on the stockpile (which could influence the number of different coal brands that can be purchased), and possibly

- The catch-up capability of the discharge system (since a large stockpile might be more tolerant of a slower catch-up capability),

It is possible to build a simulation model to test the key risk factors in the coal chain for the supply of coal to a power station. The simulation model would cover the supplying mines, rail/road/barge to their loading ports, loading, ocean transportation, and discharge onto the power station's stockpile. The coal supply chain to be modelled is illustrated below.



4.2 Diversification of coal supply sources

Security of supply can be improved by diversification, which will impact on the coal supply plan. Diversification is usually measured in terms of:

- Number of economies and dependence on an economy (economic, currency and political risk),
- Number of supplying mines and dependence on a mine (and risk of major breakdowns at mine or in transportation system, weather delays, strikes, cost competitiveness), and
- Number of loading ports and dependence on a loading port (and risk of weather delays at port on during ocean voyage, congestion at port, breakdown/damage to port loader and the number of voyage days from nearest loading port, and strikes).

For example, Taipower has a policy of economy diversification that specifies the minimum and maximum percentage of coal that it can purchase from each economy. Taipower also appears to have minimum (and possibly maximum) term contract quantities.

The recent consolidation of coal industry ownership might also mean that more than one supplying mine might be owned by one of the four major sellers. In this case, the risk might be offset by a multi-sourcing arrangement with the parent company that requires the seller to supply from another approved mine if supply is unable to be delivered from the contracted mine.

4.3 Coal quality requirements

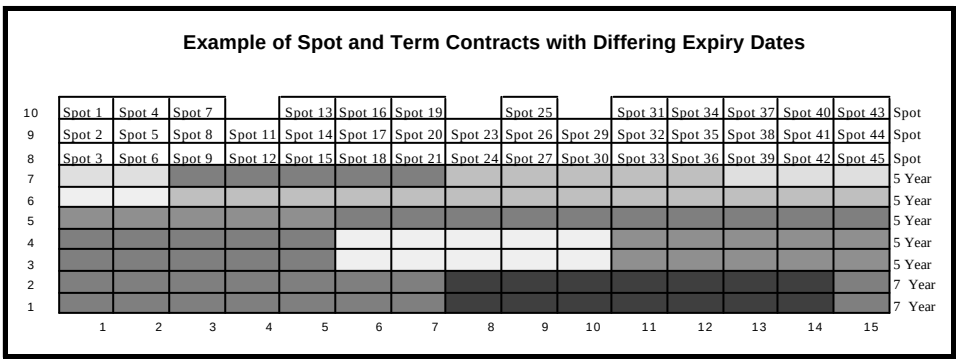
Specifications will usually contain a:

- Guaranteed specification (ash, sulphur, energy etc – and penalties and bonuses may apply to some characteristics),
- Rejection or suspension limits for critical items (particularly for items impacting on the boiler guarantee or environmental limits, especially if there are no blending facilities), and
- Typical analysis of the coal expected to be delivered.

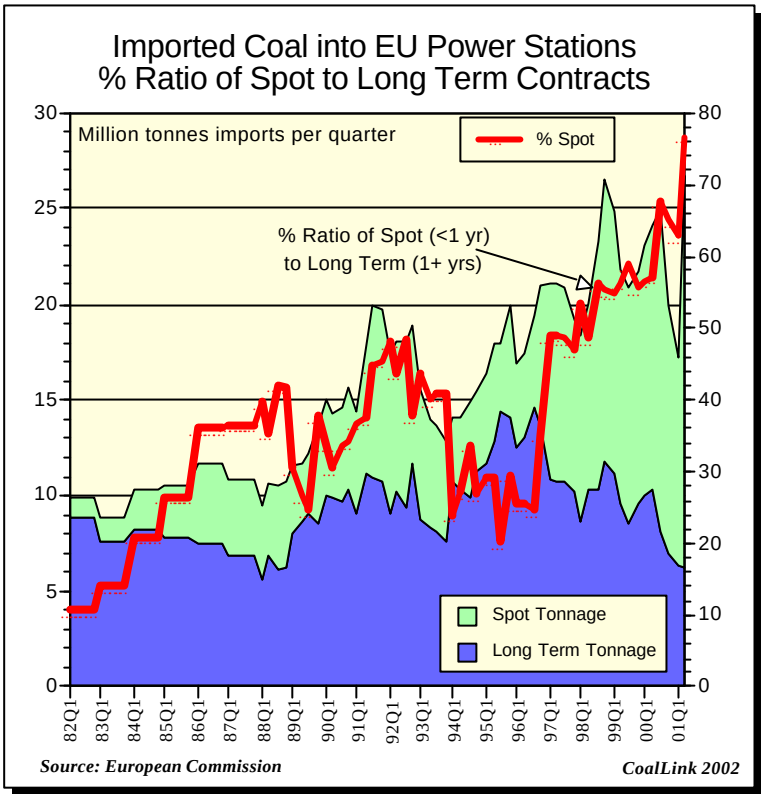
The level at which the guaranteed and rejection limits are set may impact on the selection of coal suppliers that could be included in the coal supply plan. In addition, there might be a target average energy for coal imported during the year which needs to be met, (which can also impact on the selection of coal suppliers and the amount of coal to be purchased from individual suppliers).

4.4 Spot, annual and term contract ratios and timing

Decisions about the ratio of spot, annual and term contract coal will impact on the coal supply plan (and on the average price). Given the unpredictability of the coal price cycle, decisions are needed about the length of the term contracts and timing of contract renewal (at the same or different times).
An example of differing contract terms is shown below:



In Europe, there has been a trend towards increasing the proportion of spot purchases (contracts of less than 1 year), though this might have been related to the oversupplied market (and the latest statistics are not yet available). Also European utilities tend to have larger stockpiles than Asian utilities.



Taipower has a policy of 10 to 30% spot purchases and tends to vary the spot ratio according to whether the market is oversupplied (20% to 30%) or supply is tight (10% to 20%).

When markets are depressed, buyers sometimes seek to increase the +/- buyer's option from 10% to 20%. Sellers will reluctantly agree, but whilst it enables the buyer to cut purchases by 20%, buyers should not be over-confident about receiving +20% if supply suddenly becomes tight (since sellers cannot afford to operate their mines at 80% capacity and remain competitive – and will be seeking to sell 100% of output).

A better option for the buyer might be to have an annual option amount that must be declared by the buyer before a specified date (usually 6 months into the contract year). The option arrangement would then allow the seller 6 months to sell the coal if the option is not exercised.

The length of the term contracts and ratio of spot/term might also be influenced by lender requirements. For example, the lender may want the term contracts to exceed the term of the loan.

4.5 Cost competitiveness of potential coal supply sources

The three key factors affecting the long term cost competitiveness of potential coal suppliers are:

- Relative exchange rates,
- Productivity, and
- Cost inflation.

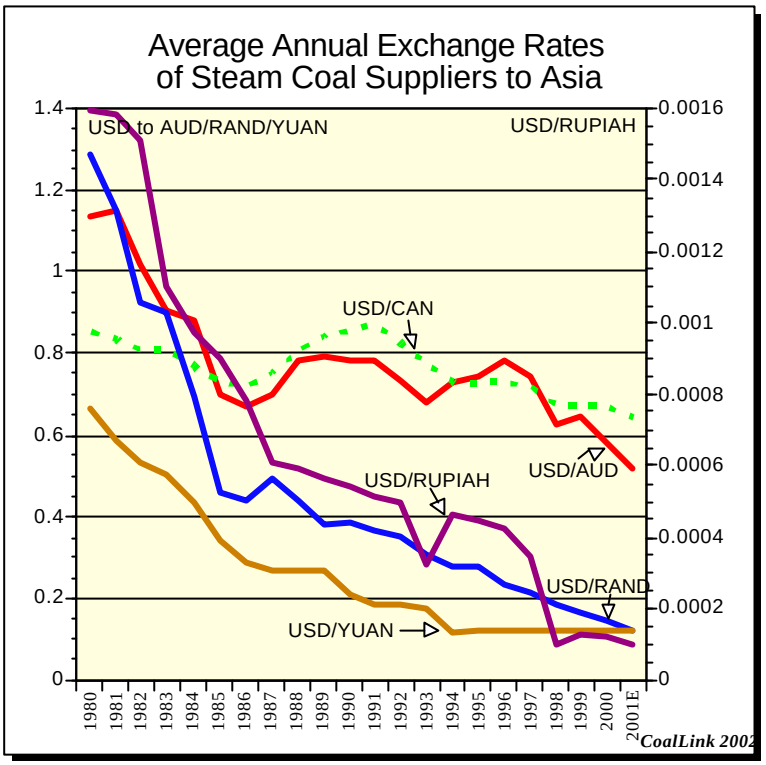
Changes in exchange rate relativities for Asian coal suppliers are shown in the chart on the next page. In recent months the Rand has collapsed from around 8 Rand to the USD to 11.4 Rand to the USD. Consequently, South Africa is now the low cost fob exporters among Australia, Indonesia and South Africa. Even after allowing for ocean freight South Africa would still be the lowest cost.

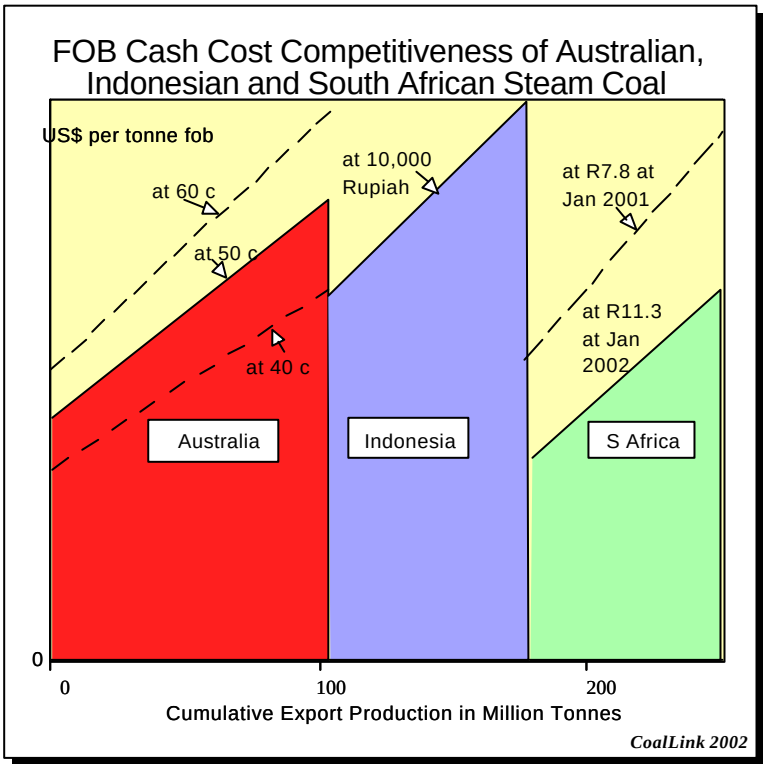
In the case of Indonesia, the sharp devaluation of the Rupiah has not assisted the cost competitiveness of Indonesian coals, since most Indonesian coal mine costs are USD costs (mining equipment and supplies, etc). In addition, domestic diesel fuel subsidies to coal mines are now being eliminated.

Consequently, with the devaluation of the Australian dollar, many Australian mines will be lower cost than Indonesia. If the AUD were to continue to devalue then Indonesia could become the high cost producer in Asia.

It is difficult to know what the fob cost is for Chinese coals, but we do know that it was not until the spot price started to rise above US$22 per tonne in mid 2001, that China started to expand its exports. If the Chinese Yuan continues to be pegged against the USD and the AUD continues to devalue then there will come a point when Australian coal will be cheaper to produce than Chinese coal (in USD per tonne).

Thus changes in relative exchange rates can significantly change the long term cost competitiveness of suppliers.





4.6 Technical and commercial approval of coal suppliers

Decisions need to be made about the technical and commercial approval of coal suppliers – and whether coal traders will be allowed to bid for coal supply (especially if the brand of the coal is unknown or not guaranteed).

If there is to be a significant proportion of spot coal in the coal supply plan, then the number of coals that have been technically approved may limit the number of potential bidders for a tender.

If lenders are involved, then there might be some further requirements in relation to a supplier's coal reserves (in relation to the length of the term contract) and credit-worthiness of the coal supplier.

4.7 Contract terms

If lenders are involved then the term contracts may need to contain some 'harsh' legal terms (on default etc) that might not be acceptable to some coal suppliers (and which would restrict the selection of coal suppliers).

Otherwise, coal contracts are reasonably standard for key terms. However, problems can arise in relation to: rejection (or suspension), alternate coal supply (especially in relation to force majeure), payment terms, unusual penalty/bonus clauses, options, governing law and dispute resolution.

4.8 Relationship between buyer and seller

The attitudes of the buyer's and seller's staff conducting the relationship are important in managing the difficulties that will arise on both sides from time to time.

In the end, it comes down to whether there is 'give and take' or whether there is a strict legalistic approach. In some cases, the buyer, if a government body will have the difficulty of an audit function to contend with (which may restrict flexibility). This might need to be taken into account when drafting the contract terms, so that there is sufficient flexibility (or a process that enables flexibility) for the contract to be practically workable when both sides experience difficulty. Lack of flexibility can impact on the coal supply plan.

4.9 Utilities own fuel department or outsourcing to a fuel manager

Most utilities use their own fuel department, as this provides the preferred amount of control over coal purchasing.

However, there are instances where a fuel manager might be contracted to supply coal – and which often involves some allocation of the coal supply risk to the fuel manager (for example, by restricting the use of force majeure).

The use of a fuel manager will reduce the cost of the utilities own fuel department to a contracts manager, but on the other hand the fuel manager will want a commission (or profit depending on the outsourcing arrangements). The utility would need to have a separate coal supply contract with the fuel manager, which could include diversification and stocking policies.

5.0 Preparing the Coal Supply Plan

5.1 Determine key coal supply plan guidelines

The first step in the preparation of the coal supply plan is to agree and determine the policy guidelines. An example of a worksheet that could be used is shown below.

Coal Supply Plan - Policy Guidelines	Units	Typical	Min	Max
Power Station Capacity	MW			
Annual Coal Consumption	Mt			
Annual Average Energy	kcal/kg gar			
Min Stockpile	Days			
Min Stockpile	Mt			
Average Stockpile	Mt			
Coal Quality Requirements				
Energy	kcal/kg gar			
Total Moisture	% ar			
Volatile Matter	% ar			
Ash	% ar			
Sulphur	% ar			
HGI				
AFT Reducing Initial	Deg C			
Fuel Ratio				
Economy Diversification				
Australia	% or Mt			
Indonesia	% or Mt			
South Africa	% or Mt			
China	% or Mt			
No of Ports	Number			
No of Mines	Number			
Contract Size				
Term	000's tonnes			
Spot	000's tonnes			
Spot/Term ratio				
7 year term	% or Mt			
5 year term	% or Mt			
3 year term	% or Mt			
Spot	% or Mt			

There may, of course, be other policy guidelines that are specific to a particular power station – and these would need to be added.

5.2 Develop initial coal supply plan

Using the policy guidelines and candidate coals it is useful to prepare a number of alternative coal supply plans as shown below.

Initial Coal Supply Plans							
	Candidate Coal Suppliers				Alternative Contract Tonnage Plans		
Coal Brand	Mine Owner	Tonnage Offered	Port	Energy	Plan A	Plan B	Plan C
TERM CONTRACTS							
Country 1							
Brand No 1			Port T				
Brand No 2			Port T				
Brand No 3			Port U				
Brand No 4			Port U				
Country 2							
Brand No 5			Port V				
Brand No 6			Port V				
Brand No 7			Port V				
Country 3							
Brand No 8			Port W				
Brand No 9			Port W				
Brand No 10			Port X				
Country No 4							
Brand No 11			Port Y				
Brand No 12			Port Z				
SPOT CONTRACTS							
Economy 1							
Economy 2							
Economy 3							
Economy 4							
Total Tonnage							
% Economy 1							
% Economy 2							
% Economy 3							
% Economy 4							
Average Energy							

5.3 Test the alternative coal supply plans

It would be useful to test, either manually or using a simulation model, the alternative coal supply plans to see whether the plant runs out of coal (or the right quality coal) when subjected to unexpected events (mine strikes, power station problems, loading or unloading port closures, bad weather, political events, natural disasters, tight supply etc).

By testing the alternative coal supply plans an appreciation can be gained of how each alternative plan impacts on the ability of the power station to continuously produce electricity.

The more detailed the testing, then the more detailed will be the understanding of the critical factors (and not so critical factors) for that particular power station.

5.4 Start negotiations

It is now time to implement the coal supply plan. As negotiations proceed the coal supply plan can be revised to meet the circumstances of the negotiations, provided the overall policy guidelines are met.